Meteorological observations at Honolulu, April, 1900.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 2:30 a. m., Honolulu time.							Sea-level pressures.		Total rainfall at 9 a. m., local time.
		Dry bulb.	Wet bulb.	Temperature. Maximum.	Temperature. Minimum.	Means. Dew-point.	Means. Relative humidity.	Wind. Prevailing direction.	Wind. Force.	Average cloudiness.	Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	30.00	70	62.5	80	62	57.7	65	nne.	3-0	2	30.05	29.95	0.00
2	30.01	72	67.5	79	65	61.7	67	ene.	3-0	2	30.07	29.97	0.00
3	30.05	69	66.5	82	67	65.5	71	e.	3-0	3-8	30.11	30.02	0.00
4	30.04	68	65.5	82	69	66.5	75	sw.	2	3-10	30.12	30.03	0.00
5	30.05	72	66.5	85	68	65.3	72	sw-e.	2	3	30.11	30.02	0.00
6	30.07	73	67	83	67	63.5	65	e-ne.	3	3	30.12	30.03	0.10
7	30.05	73	66.5	81	69	64.0	70	ene-nne.	3-5	8-3	30.15	30.01	0.00
8	29.99	70	65	82	72	62.5	63	ne.	3	3	30.09	29.99	0.01
9	29.96	68	66	82	70	61.5	64	ne.	3-5	1	30.00	29.90	0.13
10	29.95	67	66	78	66	63.3	73	ne.	4	8-2-8	30.00	29.90	0.42
11	29.99	70	66.5	75	66	66.5	87	ene.	4	9	30.05	29.95	0.60
12	30.00	73	67	79	69	65.5	75	ne.	4-5	6	30.06	29.97	0.11
13	29.99	73	67	80	70	65.0	71	ne.	3	5	30.05	29.96	0.16
14	29.96	68	65	81	73	63.7	65	ene.	4	3	30.03	29.95	0.00
15	29.96	70	66.5	83	68	63.3	67	nne.	2	1	30.02	29.92	0.05
16	30.01	68	64.5	81	69	64.0	67	ne.	2	3-6	30.05	29.97	1.33
17	30.00	68	59.5	74	66	59.0	69	nne.	4-6	7	30.04	29.98	0.00
18	29.97	64	62	73	67	55.3	60	nne.	4	9	30.06	29.94	0.25
19	29.95	66	62	74	62	58.0	68	nne.	4	7	30.01	29.94	0.29
20	29.96	71	64	75	63	61.7	76	ne.	3	8	30.00	29.93	0.06
21	29.95	70	65	78	68	62.0	69	nne.	4	7	30.02	29.93	0.09
22	29.96	71	66.5	79	67	63.5	72	ne.	3	6-3	30.02	29.93	0.01
23	29.96	71	66.5	79	70	65.0	78	ne.	3	9-4	30.02	29.95	0.18
24	29.97	69	67	80	69	66.0	76	ne.	3	7	30.08	29.97	0.31
25	29.97	66	65.5	79	68	65.7	78	ne.	2	8-10	30.04	29.95	0.82
26	29.94	66	64.5	80	66	66.5	84	sw-w-ne	1-0	4-8-0	30.01	29.92	0.29
27	29.92	68	66	81	64	66.0	81	sw-w-ne	0-2	1-6-0	29.99	29.91	0.01
28	29.90	65	64	81	65	66.5	80	sw-w-ne	0-2	0-7-0	29.96	29.87	0.00
29	29.95	63	61	79	64	64.3	78	n-s-w.	0-2	8-0	29.98	29.89	0.00
30	29.98	64	60	78	61	59.5	69	sw-ne.	1	6-0	30.02	29.94	0.00
Sums.													5.23
Means.	29.982	68.9	65.0	79.4	67.0	63.3	71.7		2.7	4.8	30.044	29.943	
Departure.	−0.20					0.0	0.0			−0.3			+2.24

Mean temperature for April, 1900 (6 + 2 + 9) ÷ 3 = 72.8; normal is 72.8. Mean pressure for April (9 + 3) ÷ 2 is 29.898; normal is 30.018.

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 7:29 p. m., Greenwich time. ‡These values are the means of (6+9+2+9)+4. §Beaufort scale. ‖3-10-0. ¶1-0-10.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for April, 1900.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Arteaga (Coahuila)	.....	.....	87.8	50.0	70.7	.....	.....	.....	.....
Culiacan Rosales (Sinaloa)	112	29.72	90.5	62.6	75.4	47	.....	w.	.....
Durango (Seminario)	6,243	23.98	84.2	42.8	60.6	35	.....	sw.	w.
Gral Zepeda (Coahuilla)	.....	.....	100.4	41.0	71.8	.....	.....	.....	.....
Guanajuato	6,640	23.66	88.5	48.2	67.6	38	0.14	wsw.	sw.
Leon (Guanajuato)	5,934	24.24	89.2	44.2	67.3	37	T.	w.	w.
Mazatlan	25	29.91	81.0	61.3	72.7	71	.....	nw.	sw., w.
Merida	50	29.89	101.3	59.0	84.4	63	2.36	se.	se.
Mexico (Obs. Cent.)	7,472	23.01	86.0	46.4	64.8	42	0.79	sw.	sw.
Morelia (Seminario)	6,401	23.94	84.0	45.3	64.0	44	0.24	s.	w.
Parras (Coahuilla)	3,986	.....	88.7	49.1	73.0	.....	.....	.....	.....
Puebla (Col. Cat.)	7,112	23.35	84.2	48.6	67.8	48	0.02	ese., ssw.	sw.
Puebla (Col. d. Est.)	7,118	23.30	84.9	47.8	66.6	45	0.20	nne.	w.
Saltillo (Col. S. Juan)	5,399	24.66	84.7	38.8	65.1	55	T.	s.	sw.
San Isidro (Hac. de Guanajuato)	.....	.....	78.4	59.9	.....	.....	0.20	w.	.....
Silao	6,063	24.22	84.9	54.9	68.9	44	0.03	wsw.	w.
Tuxtla (Gutierrez Chiapas)	1,864	28.13	100.4	55.4	77.2	63	.....	nnw.	sse.

THE DROUGHT OF 1899 IN SOUTHWEST MISSOURI.

By Mr. J. S. HAZEN, Observer, Springfield, Mo.

The three months of dry weather, accompanied by long continued high temperature at Springfield, Mo., during the summer of 1899, proved a serious matter to nearly all classes of business, and a fruitful topic of discussion, in a climatological sense.

The fact of the drought being to some extent local, did not lessen the annoyance nor abate the suffering and loss to this community. The ground became dry to a depth of 4 feet, while for weeks at a time the country roads were almost impassible because of the dust. The corn crop was practically a failure; late fruits and garden truck nearly so, while the damage to lawns, meadows, pastures, and forest and fruit trees was severe. Numbers of trees died, many more shed their leaves prematurely with the probability that they may never recover their full vitality.

The accompanying numerical tables giving departures from normal conditions, for the years 1897 and 1899, show a remarkable similarity in many respects. Much of the rain which fell earlier in the season, in both years, occurred in heavy showers, and as a consequence a large amount of what might, with light or ordinary rains, have been surplus moisture, was lost to the soil before it could be absorbed. Many people claimed that the soil actually contained less moisture, and that the effect of the drought on vegetation was more noticeable in 1897 than was the case during the summer of 1899. Whether such a statement is true or not, I can not say, but the records of this office show that more rain fell during July and August, 1897, than during the same period for 1899. From August 14 to September 16, 1899, the rainfall was only 0.38 inch and only about three-fourths of an inch fell from July 30 to September 16, inclusive. When the fact is taken into consideration that no rainfall between June 15 and September 17, wet the soil more than 2 inches below the surface, we can more nearly appreciate the severity of the drought. In addition to the light rainfall the past summer was characterized by an excess of temperature, an abnormal amount of sunshine, and a high average wind velocity.

During the last ten days of August and the first ten days of September, 1899, the daily average excess in temperature was nearly 10°, while the total excess in daily temperatures from March 1 to October 10 was over 700°. There were but two days during August on which the temperature fell below normal.

During August and September, 1897, there was a longer period of continuous dry weather than was recorded during 1899. From August 21 to September 16, 1897, only 0.10 of an inch of rain fell, and during the entire month of September only 0.37 inch fell. The drought also extended well through October.

During July, August, and September, 1899, comparatively few upper clouds were observed, and from the middle of August until the middle of September, practically none were seen. During the summer of 1898, which was a year of abnormally heavy rainfall, upper clouds predominated, and but comparatively few distinctive cumulus clouds were recorded. During July, August, and September, 1899, an unusually large amount of the distinctive cumulus or fair weather type of clouds was observed. Cumulus clouds varying from a few to four-tenths were observed on twenty-one days during August. During the second week in September there was a period of six days on which no clouds were observed, and, as compared with the previous week, the temperature had fallen about 10°.

During the latter part of August and the first of September the change in the character of the clouds was gradual, but well marked. The cumulus type gradually took on a strato-

cumulus or stratus formation, and after September 17, when the drought was partially relieved by a fair rain, no distinctive types of the cumulus clouds were observed. September 17 was apparently the turning point or transition period between summer and fall conditions, and although the drought continued through October, the clouds observed were of a radically different type. Strato-cumulus and stratus types prevailed, with an apparently increasing amount of upper clouds.

The inclosed photographs[1] will give a fair idea of the cumulus types referred to. The clouds shown in the photographs are apparently typical cumulus or "fair weather clouds," and proved to be especially characteristic of dry summer weather conditions in this locality during 1899. Two cloud pictures were taken later and exhibit more of the stratus type. They were at a less elevation than the cumulus types and were moving in a different direction from the upper cumulus clouds. They also, as will be seen from the photographs, appear darker with a more broken outline and had apparently settled down from the cumulus clouds. The characteristic differences can be detected more readily from the photographs than from any description.

These types of clouds were particularly indicative of fair settled weather during the summer of 1899. No rain occurred within three days following such types of clouds, and in one example given (photograph B) no rain occurred within the following week.

During the summer of 1898 very few distinct types of the cumulus clouds were observed and the records show the heaviest rainfall ever observed at this station. A series of photographs or cloud observations during wet and dry seasons will doubtless give valuable results. It will be necessary, however, to differentiate closely between cumulus and cumulonimbus types.

Many interesting queries are suggested by a study and comparison of the accompanying tabular data. Table 1 shows a small gradual increase in the amount of southeast wind from July to October for the years 1897 and 1899, and also indicates a decided increase in the rain deficiency, directly opposed to the theory that the direction of the wind has a modifying effect upon the rainfall. In Table 2 we compare the average number of times rain followed winds from the north, northeast, east, etc., for a period of ten years, with the actual number of such rainy days during 1897 and 1899. The total number of winds from the different directions is also shown. The data given under annual average temperature departures for each wind (Table 2) agree substantially with the normal law of distribution of temperature with wind, and we find that a year with deficient rainfall gives an excess of temperature. The theorem that deficient rainfall gives an excess of temperature for this locality during the summer months, is strengthened by the long continuance of high temperature and southeast winds during 1897 and 1899. It will be observed that the average number of rainy days following winds from the southeast and northwest is larger than from other directions, and also that the southeast wind was followed by more rainy days during the years 1897 and 1899 than on the average, notwithstanding the deficiency in rainfall during those years.

A comparison of the different tables shows so many exceptions to preconceived ideas that any attempt to reconcile the discordant elements only emphasizes the old adage that "all signs fail in dry weather." When terrestrial signs fail what then remains? In the opinion of the writer the solution, not only of this problem but of many more pertinent questions in meteorology, must be sought for higher up. The great bulk of the upper air still remains an unexplored territory, and it is to this region we must turn.

[1] The Editor regrets that these photographs do not admit of reproduction as half-tones.

TABLE 1.

Months.	Number of observations of southeast wind.					The rainfall.				
	Normal.	1897.	Departure.	1899.	Departure.	Normal.	1897.	1899.	Average, 1897-99.	Departure.
May	14	21	+ 7	17	+ 3	6.18	2.48	6.72	4.60	— 1.58
June	15	20	+ 5	20	+ 5	4.58	5.36	5.24	5.30	+ 0.72
July	15	10	— 5	10	— 5	4.63	2.48	1.48	1.98	— 2.65
August	16	10	— 6	20	+ 4	4.01	1.48	0.75	1.12	— 2.89
September	16	27	+11	15	— 1	3.96	0.37	1.06	0.72	— 3.24
October	17	30	+13	19	+ 2	2.41	0.93	5.41	3.20	+ 0.79

TABLE 2.

Direction.	Annual wind frequency.				Annual average temperature departure for each wind.	
	In general.	Followed by rain.				
		Normal.	1897.	1899.	Normal.	1897-99.
					°	°
North	82	20	21	21	— 36	— 44
Northeast	67	18	8	18	— 19	— 30
East	61	15	8	8	+ 8	+ 8
Southeast	192	28	32	30	+ 46	+ 50
South	133	22	17	22	+ 42	+ 48
Southwest	64	12	8	3	+ 19	+ 29
West	43	8	8	11	— 2	— 5
Northwest	90	17	21	21	— 45	— 45
					+115	−124
					−102	+135

THE CLIMATOLOGY OF HAVANA, CUBA.[1]

By Dr. ENRIQUE DEL MONTE, dated January, 1898.

I.—LOCATION AND APPARATUS.

1. The Meteorological Observatory of Havana was erected in 1886 in the Vedado Park, lying in a western and most fashionable quarter of the city. The building had all the requisites necessary for the work for which it was destined—it was well isolated, the main floor was 30 feet above sea level, and about 350 yards from the sea shore—so that the circulation of the air was perfect, and free from the radiations so commonly affecting this kind of work in large cities. The installation of the thermometers and psychrometers was the object of great attention and study, and was accomplished in the following manner: On the flat roof or platform of the building a small room was erected (8 feet across) of an octagonal shape, surrounded with venetian blinds, at an angle of 45 degrees, and roofed with a mixture of plaster of paris, so as to render it more obstructive to the heat than the ordinary roof painted with white lead. In this way the temperatures taken are, we believe, correct.

2. To our great surprise we have often seen in encyclo-

[1] Many years ago a school of agriculture was founded at Havana under the special patronage of the Count of Casa Moré, President of the Society of Planters. Its courses of instruction were under the direction of able professors, and there were attached to it experimental conveniences, a meteorological observatory, and other evidences of scientific work. The events of the past few years have apparently checked the good work begun at that time, but the need of such an institution as the modern college of agriculture and agricultural experiment stations is greater than ever, and we are pleased to learn that Señor Biscay and Don Manuel Calvo have offered to cooperate with the Cuban government in the establishment of a new school of agriculture.

The meteorological observatory of this college was suggested by Count Moré in July, 1886; the idea was realized through the enthusiastic assistance of shipowners and planters; among them the Count of Morteva and Messrs. Arrieta, Ibañez, Mesa, Alfonso, M. Artiz, and numerous merchants were prominent donors. Dr. Enrique del Monte, a professor in the Havana University, was chosen director of the new observatory, which was inaugurated on January 1, 1887, under the auspices of the agricultural college. The director promptly began to establish substations throughout the island, but apparently accomplished this only in part, in the eastern and western ends of Cuba. Early in